SATHYABAMA UNIVERSITY

(Established under section 3 of UGC Act, 1956)

Course & Branch: B.E./ B.Tech - CSE/IT/ECE/EEE/E&C/EIE/CHEM/ETCE
Title of the paper: Applied Physics - II
Semester: II Max. Marks: 80
Sub.Code: ET203A/4ET203A/5ET203A Time: 3 Hours
Date: 13-12-2007 Session: AN

PART – A (10 x 2 = 20)

Answer All the Questions

1. State Wiedemann-Franz law.
2. Comment on Josephson effect.
3. Define Fermi level in semiconductors. Draw its position for a P-type semiconductor.
4. Based on band theory, define a semiconductor, State the important property of an intrinsic semiconductor with respect to the number of charge carriers.
5. Define coercivity of a magnetic material.
6. What are magnetic domains
7. State whether laser action is possible or not for the following condition.
   Spontaneous emission / Stimulated emission = 3/2.
   Give valid reason for your answer.
8. Write down the conditions for the light wave propagation in optical fibres
9. What are Bravais lattices. Give the expression for atomic radius for an FCC structure.
10. What is meant by dielectric loss. Mention the name of any two dielectric breakdown mechanism.

Part – B (5 x 12 = 60)

Answer All Questions

11. (i) Derive an expression for the electrical conductivity in metals based on free electron theory (10)
    (ii) The conductivity of silver is 6.2×10^{-7} Ω-m and the number of free electrons per unit volume is 5.8×10^{28} /m^3. Calculate the relaxation time. (2)

(or)

12. (i) Discuss the BCA theory of superconductivity (6)
    (ii) Distinguish between hard and soft super conductors (4)
    iii) Define critical temperature of a superconductor (2)

13 i) Derive an expression for electron concentration in an intrinsic semiconductor . (10)

ii) Sketch the variation of carrier concentration with temperature in an intrinsic semiconductor. (2)

(or)

14. i) Explain the principle ,construction and working of a Light Emitting Diode. (8)

ii) Compare between Light Emitting Diode and Liquid Crystal display (4)

15. i) Give the classification of magnetic materials and compare their properties.

ii) Distinguish between hard and soft magnetic materials.

(or)

16. Discuss the principle and working of the following magnetic memories

(i) Magnetic Bubble (ii) Floppy disk

17. i) With an energy level diagram,. Explain the working of a Carbon di-oxide laser. (10)

ii) What is meant by 3-D profiling. (2)

(or)

18. i) Draw the block diagram of an optic fibre communication system and explain the function of each block. (6)

ii) List out any four differences between a step index and graded index fibres.. (4)

iii) What is meant by attenuation in optical fibres (2)

19. i) Define atomic packing factor and determine the same for BCC and SCC structures. (10)

ii) Calculate the perpendicular distance between the two planes indicated by the Miller indices (121) and (212) in a unit cell of a cubic lattice with a lattice constant parameter 'a' (2)

(or)

20. i) Define internal field of a dielectric material. (2)

ii) Derive Claussius – Mosotti equation. (6)

iii) If a sodium Chloride crystal is subjected to an electric field of 1000 V/m and the resulting polarization is 4.3×10^{-8} cm^2, Calculate the relative permittivity (ε_1) of Sodium Chloride. Given that the permittivity of free space (ε_0) is 8.85×10^{-12} F/m. (4)